REMARKS

Claims 1-11, 14-20 and 22-49 are rejected. Claims 1-11, 14-20 and 22-91 are presently pending in the application. Favorable reconsideration of the application in view of the following remarks is respectfully requested.

Rejection of Claim 26 and X Under 35 U.S.C. §112:

The Examiner has rejected Claim 26 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, indicating that the use of "autochrome" appears to be a trademark, the use of trademarked terms in claims does not identify or describe the goods associated with the trademark or trade name, and trademarks or trade names are used to identify a source of goods, and not the goods themselves. The Examiner has advised replacement of trademarked terms with a generic description is advised.

MPEP 608.01(v) states "Language such as "the product X (a descriptive name) sold under the trademark Y" is permissible." As noted by the Examiner, Applicant argues the use of trademarked term Autochrome® and points to MPEP 608.01(v) stating the "Language such as "the product X (a descriptive name) sold under the trademark Y" is permissible". Claim 26, as amended appears as follows: "The article of Claim 1 wherein said imaging layer comprises a thermal imaging layer sold under the trademark AUTOCHROME". The descriptive name X is "thermal imaging layer". Yamaguchi, provided by the Examiner, indicates printing of TA paper using a thermal head 36, indicative of the presence of a thermal imaging layer. See col. 7, lines 45-62; see also U.S. Pat. No. 7,153,620, [0096] ("In another embodiment, a thermal imaging system, described in, inter alia, U.S. Pat. Nos. 4,771,032; 5,409,880; 5,410,335; 5,486,856; and 5,537,140, and sold by Fuji Photo Film Co., Ltd. under the Registered Trademark "AUTOCHROME" which does not depend upon transfer of a dye, with or without a binder or carrier, from a donor to a receiving sheet may be utilized with the present invention.") and U.S. Pat. Nos. 6,054,246, 6,493,015, 7,083,885, containing identical language. Applicants believe they have complied with the requested change in a manner indicated as acceptable by the MPEP and consistent with the terminology in the specification as originally presented to avoid the introduction of new subject matter.

Double Patenting:

The Examiner has rejected Claims 1-49 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-26 of U.S. Patent No. 6,537,656 to Dontula et al. in view of UPSN 5,916,672 to Reeves et al, as Dontula teaches the closed cell foam core sheet with imaging layer applied thereto. The Examiner indicates that, although the conflicting claims are not identical, they are not patentable distinct from each other because the present claims differ only in the recitation of the density gradient recitations and Reeves teaches a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient and the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness, making it obvious to one having ordinary skill to modify the invention based on the teachings of Reeves above. The Examiner also states that, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, the present claims are broader in scope and encompasses that which is claimed by the Dontula reference.

The Examiner notes that Applicant argues the Double Patenting and 103 rejections over Reeves and Dontula, alleging a single layer of foam with a density gradient is not taught or suggested, but indicates that Applicant's argument is not convincing because Applicant does not claim a single layer, but at least one closed cell foam layer. Claim 1 appears as follows:

> "*1. An article comprising a base wherein said base comprises a closed cell foam core sheet, wherein said closed cell foam core sheet comprises at least one closed cell foam layer, wherein said at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient, and wherein said article further comprises at least one imaging layer applied thereto.*"

The wording of the claim indicates a base of a closed cell foam core sheet. This core sheet has at least one closed cell foam layer. This "*at least one*" closed cell foam layer has a density gradient. In other words, as read, the

claim indicates that each layer of closed cell foam present in the core sheet contains a density gradient. If there is one layer of foam, there is one density gradient – the gradient contained within the one layer. If there are two layers of closed cell foam, there are two density gradients – a density gradient internal to each of the foam layers. If there are three layers of closed cell foam, there are three density gradients. Each single layer of closed cell foam has its own, individual internal density gradient, i.e., "*wherein said closed cell foam layer has a density wherein said density comprises a gradient.*" Referring to Fig. 3 of Reeves, it is clear that extruded foam core 130 has three foam layers. Each of the three layers is of uniform density. When adhered together, the three layers produce a core with a density gradient. See col. 6, lines 14-33. On the other hand, the present invention, as claimed, would have three layers, each with a density gradient internal to the individual layer, resulting in a drawing with three foam layers showing three density gradients. Fig. 3 shows nothing of the kind.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order, as illustrated in Fig. 3.

Dontula '976 discloses imaging media. In a preferred form, it relates to supports for photographic, ink jet, thermal, and electrophotographic media on a base of a closed cell foam core sheet and adhered thereto an upper and

lower flange sheet. The imaging member has a stiffness of between 50 and 250 millinewtons and at least one layer of the base comprises whitening agent and the element has L* of greater than 90.4.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet. The closed cell foam core she is contains at least one closed cell foam layer that has a density gradient. The density gradient is internal to the closed cell foam layer.

The Applicants believe that Reeves is non-analogous art. MPEP 2141.01 indicates "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Here, Reeves is not in Applicant's field of endeavor, that is, an article comprising a base having at least one imaging layer applied thereto. Neither is the reference reasonably pertinent to the needs of supports for imaging layers. Such supports must be thin, smooth and somewhat flexible. (See, for example, pg. 16, line 8 – pg. 17, line 8 ("*The suitable range in caliper (thickness) of an article made with a polymeric foam core may be between 25 and 1000 mm. Such article may further comprises a foam core with at least one flange layer attached thereto. Such an article may be used for a variety of application such as packaging, printing media for labels, packages, printing paper, synthetic paper and imaging elements. Typically for imaging elements and in particular photographic imaging elements the overall thickness of the base should be constrained to between 100 and 400 mm. Imaging elements below 100 mm, while achievable, are low in stiffness and are less desirable from a customer standpoint while bases above 400 mm are very stiff and have problems transporting through various photofinishing equipment. Since the preferred imaging element base useful in this invention has a foam core and at least one flange, it is desirable to have a foam core with a thickness of from 25 mm to 300 mm. The preferred caliper (thickness) range is from 50 mm to 200 mm because of the preferred overall caliper (thickness) range of the element, which lies from 100 mm to 400 mm. The preferred modulus of the foam core of the invention ranges from 30 MPa to 1000 MPa. In each case, the above range is preferred because of (a) consumer preference, (b) manufacturability, and (c) materials selection. It is*

noted that the final choice of flange and core materials, modulus, and caliper (thickness) will be a subject of the target overall element stiffness and caliper (thickness). Flange layers are particularly useful when the properties of the foam core alone are not sufficient to meet the requirements of a conventional paper-based imaging element. The range in density reduction of the foam core is from 20% to 95%. The preferred range in density reduction is from 40% to 70%. This is because it is difficult to manufacture a uniform product with very high density reduction (over 70%). Density reduction in percentage is the ratio of the difference between solid polymer and a particular foam sample to the solid polymer multiplied by 100. It is also not economical to manufacture a product with density reduction less than 40%. The foam core layer of the imaging element of this invention has a surface smoothness from 0.5 to 2mm, while the final imaging element has a roughness average of between 0.1 to 1.4 mm. In one preferred embodiment, a cast sheet has a cast quenched roughness of from 0.1 to 2.0 mm. "), pg. 19, lines 22-28 ("*Imaging elements are constrained to a range in stiffness and caliper (thickness). At stiffness below a certain minimum stiffness, there is a problem with the element in print stackability and print conveyance during transport through photofinishing equipment, particularly high-speed photoprocessors. It is believed that there is a minimum cross direction stiffness of 60 mN required for effective transport through photofinishing equipment. At stiffness above a certain maximum, there is a problem with the element in cutting, punching, slitting, and chopping during transport through photofinishing equipment. It is believed that there is a maximum machine direction stiffness of 300 mN for effective transport through photofinishing equipment. It is also important for the same transport reasons through photofinishing equipment that the caliper (thickness) of the imaging element be constrained from 100 μm to 400 μm.*").

Patent and Trademark Office Classification is some evidence of analogy, but similarities and differences in structure and function carry more weight. MPEP 2141.01(a). The reference to Reeves cited by the Examiner is contained in a different classification. Reeves is contained in US Class 428/319.9 (Stock material or miscellaneous articles/ Hydrocarbon polymer), while the present invention is contained in US Class 428/304.4 (Stock material or miscellaneous articles / Composite having voids in a component (e.g., porous,

cellular, etc.)). Critical differences exist in function between Applicant's invention and the cited references. The invention of Reeves functions to replace such materials as wood and fiberglass used in boat hulls, decks, camper tops and coolers and provide impact resistance and absorb energy from wave impact. See col. 3, line 63 – col. 4, line 24, as well as col. 7, lines 28-38. Unlike the reference, the present invention functions to provide a print imaging support that is widely accepted by the consumer for imaging applications, and has the caliper, stiffness, smoothness, gloss, whiteness, and opacity expected by consumers of imaging media. Further there are important structural differences between the present invention and the prior art which are evidence of non-analogousness. The invention of Reeves contains no imaging layers. The present invention teaches an imaging layer on a base appropriate for imaging applications. Imagine for a moment using a sheet of photographic material, typically .004 – .016 inches in thickness, as a boat hull. Now imagine using the material used to make boat hulls to preserve photographic images. Since the cited reference is contained in a different classification, serves a different purpose and function and contains distinct structural differences, the Applicants respectfully suggest that the cited reference is non-analogous art, and does not support a rejection based on obviousness.

Assuming for argument, that the cited references are analogous art, to establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and

col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Dontula is silent with respect to foams having density gradients. The references to Reeves and Dontula, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Dontula, while disclosing foam for use in the support of an imaging element, fails to mention gradient density in the foam layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said*

density comprises a gradient". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Claims 2-49 benefit from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above.

Rejection Of Claims 1-3, and 7-11 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-3, and 7-11 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,872,673 to MacAulay, as Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient, the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped (solid polymer matrix and gaseous phase) and may be contained in a numerous amounts of layers to reach the chosen thickness, and, while Reeves doesn't state the density gradient decreasing from center to surface or the use of three foam layers, it would have been obvious to one having ordinary skill to modify the invention based on the teachings of Reeves above, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272. The Examiner continues that, although Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1, MacAulay teaches a laminate comprising expanded polyolefin

and polyurethane foams being closed or open comprising a blowing agent useful for strength and structural integrity, making it obvious to one having ordinary skill in the art to have modified the polymer foam core of Reeves to use the polymer closed cell foam core with use of a blowing agent of MacAulay because MacAulay teaches a laminate comprising expanded polyolefin and polyurethane foams being closed or open comprising a blowing agent useful for strength and structural integrity.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

MacAulay discloses a laminate and insulation board containing such laminate and a method of making the board are disclosed. The products are useful for residences and light commercial buildings. Such boards possess high strength, excellent structural integrity, and excellent oxygen and water vapor barrier properties.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded

through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. MacAulay is silent with respect to foam layers having density gradients. The references to Reeves and MacAulay, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet as a base for an imaging layer, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. MacAulay fails to mention gradient density in the foam layer of a foam core sheet bearing an imaging layer, disclosing only foams of unknown density profile for use as laminate and insulation board for residences and light commercial buildings, which possess high strength, excellent structural integrity, and excellent oxygen and water vapor barrier properties. MacAulay does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of MacAulay for information relating to the support for an imaging layer. Reeves discloses the use of multiple layers of foam, fused together, to

produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull or building insulation, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claims 1-11 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-11 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,093,481 to Lynn et al, indicating that Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient, the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness, and, while Reeves doesn't state the density gradient decreasing from center to surface or the use of three foam layers, it would have been obvious to one having ordinary skill to modify the invention based on the teachings of Reeves above, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. The Examiner continues that, although Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1, nor a polymer of polypropylene derivatives or copolymers or blends or polyester, Lynn teaches a laminate comprising polymer foam cores of polyolefin, polyurethane, polyester, and other copolymers and polymeric types and blends being closed or open comprising a blowing agent useful for strength and structural integrity, making it obvious to one having ordinary skill in the art to have modified the polymer foam core of Reeves to use the polymer of polyolefin, polyurethane, polyester, and other copolymers and polymeric types and blends closed cell foam core with use of a blowing agent because Lynn teaches a laminate comprising polymer foam cores of polyolefin, polyurethane, polyester, and other copolymers and polymeric types and mixture blends being closed or open comprising a blowing agent useful for strength and structural integrity.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is

attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Lynn provides a method for continuously manufacturing an insulation board by facing a foam-forming composition with one or two facing sheets to form a singly or doubly faced composite, at least one sheet comprising either a tough polymeric layer or a laminate of a tough polymeric layer with at least one other facing material, the tough polymeric layer of at least one sheet facing to the outside of the composite, and foaming and curing the faced foam-forming mixture to produce an insulation board having an exceptional hardness and puncture resistance.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed

cell foam core sheet. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines 20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Lynn is silent with respect to foam layers having density gradients and the ability to produce density gradients in foam layers made of polyolefin, polyurethane, polyester, and other copolymers and polymeric types and blends. Lynn is also silent with respect to supports for imaging layers. The references to Reeves and Lynn, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet as a base for an imaging layer, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Lynn fails to mention gradient density in the foam layer of a foam core sheet bearing an imaging layer, disclosing only foams of unknown density profile for use as rigid foam panels used in the building and construction as sound and thermal insulating materials and as non-load bearing structural members. Lynn does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Lynn for information relating to the support for an imaging layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite

structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull or rigid building materials, to duplicate the requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claims 1-3, 7-11, 15, and 18 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-3, 7-11, 15, and 18 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 4,764,420 to Gluck et al., as Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a

density wherein said density comprises a gradient, teaches the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness, and, while Reeves doesn't state the density gradient decreasing from center to surface or the use of three foam layers, it would have been obvious to one having ordinary skill to modify the invention based on the teachings of Reeves , since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. The Examiner continues that, although Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1 or, the broad term "a gaseous phase", Gluck teaches a rigid foam of expanded polyolefin and polyurethane being closed or open comprising a gaseous blowing agent for being lightweight and highly permeable, making it obvious to one having ordinary skill in the art to have modified the polymer foam core of Reeves to use the polymer closed cell foam core with use of a blowing agent and gaseous phase of Gluck because Gluck teaches a rigid foam of expanded polyolefin and polyurethane being closed or open comprising a gaseous blowing agent for being lightweight and highly permeable. In addition, the Examiner notes that, although Reeves does not teach an orientation or cast per claims 15 and 18, Gluck shows the foam made in machine direction and cast, making it obvious to one having ordinary skill in the art to have modified the Reeves foam in machine direction because Gluck shows a conventional way to produce the foam made in machine direction and cast.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of

adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Gluck discloses a thermally insulating structural laminate comprising a core of rigid plastic foam having two major surfaces, at least one of the major surfaces of the foam being attached to a facer comprising a fibrous sheet having at least one layer of an air-and moisture-impervious polymer disposed on the inner surface thereof and interposed between the fibrous sheet and the foam, the oxygen transmission of the polymer being a given value sufficient to make the facer substantially impervious to the passage of air and water vapor, resulting in the long-term preservation of insulation value.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

The Applicants believe that Gluck is non-analogous art. MPEP 2141.01 indicates "*In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.*" In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Here, Gluck is not in Applicant's field of endeavor, that is, an article comprising a base having at least one imaging layer applied thereto. Neither is the reference reasonably pertinent to the needs of supports for imaging layers. One of ordinary skill in the art knows that such imaging supports must be thin, smooth and somewhat flexible. (See, for example, pg. 16, line 8 – pg. 17, line 8, pg. 19, lines 22-28.)

Patent and Trademark Office Classification is some evidence of analogy, but similarities and differences in structure and function carry more weight. MPEP 2141.01(a). The reference to Gluck cited by the Examiner is

contained in a different classification. Gluck is contained in US Class 428/317.7 (Stock material or miscellaneous articles/ Composition of adhesive or bonding component specified), while the present invention is contained in US Class 428/304.4 (Stock material or miscellaneous articles / Composite having voids in a component (e.g., porous, cellular, etc.)). Critical differences exist in function between Applicant's invention and the cited references. The invention of Gluck functions to provide a thermally insulating, structural element for use in insulation board having a high insulation value and superior fire resistant properties, or rigid foam plastic insulation board which has especially tough and impact-resistant major surfaces, and exhibits overall good properties, including low friability, and good dimensional stability and thermal resistance, and is particularly useful in the building industry. (Abstract, col. 15, lines 35-50) Unlike the reference, the present invention functions to provide a print imaging support that is widely accepted by the consumer for imaging applications, and has the caliper, stiffness, smoothness, gloss, whiteness, and opacity expected by consumers of imaging media. Further there are important structural differences between the present invention and the prior art which are evidence of non-analogousness. The reference of Gluck contains no imaging layers. Gluck teaches the total thickness of the foam insulation board may be from about 0.25 to 6.0 inches. The present invention teaches an imaging layer on a base appropriate for imaging applications. Imagine for a moment using a sheet of photographic material, typically .004 – .016 inches in thickness, as insulation board. Now imagine using fire-resistant, rigid, insulation board to preserve photographic images. Since the cited reference is contained in a different classification, serves a different purpose and function and contains distinct structural differences, the Applicants respectfully suggest that the cited reference is non-analogous art, and does not support a rejection based on obviousness.

Assuming for argument, that the cited references are analogous art, to establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim

indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Gluck is silent with respect to foams having density gradients. Gluck is also silent with respect to the use of foam bases as supports for imaging layers. The references to Reeves and Gluck, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Gluck fails to mention gradient density in the foam layer of a foam core sheet bearing an imaging layer, disclosing only foams of unknown density profile for use as an insulation board having a high insulation value and superior fire resistant properties, which would qualify for model building code approvals and approval by the Factory Mutual Research Corporation and Underwriters Laboratories, independent risk certification firms or rigid foam plastic insulation board which has especially tough and impact-resistant major surfaces, and exhibits overall good properties, including low friability, and good dimensional stability and thermal resistance, and is particularly useful in the building industry. Gluck does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Gluck for information relating to the support for an imaging layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support

for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull or thermal insulating materials, to duplicate the requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claims 1-11, 14-20, and 29 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-11, 14-20, and 29 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in

view of USPN 6,103,152 to Gehlsen et al., indicating that Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient, teaches the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness, and, although Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1, nor using the polymers of claims 3-6 or "a gaseous phase", Gehlsen teaches a rigid foam of expanded polyolefin, polyester, and polyurethanes comprising a gaseous blowing agent useful in reducing density of a polymer matrix foam, making it obvious to one having ordinary skill in the art to have modified the polymer foam core of Reeves to use the polymers as claimed and a closed cell foam core with use of a blowing agent and gaseous phase because Gehlsen teaches a rigid foam of expanded polyolefin, polyester, and polyurethanes comprising a gaseous blowing agent useful in reducing density of a polymer matrix foam. The Examiner continues that, although Reeves does not teach an orientation or cast per claims 15 and 18, Gehlsen shows the foam made in machine direction and cast, making it obvious to one having ordinary skill in the art to have modified the Reeves foam in machine direction because Gehlsen shows a conventional way to produce the foam made in machine direction and cast, and, although Reeves does not teach the surface roughness as per claims 14 and 16-17, Gehlsen teaches the surface of the foam is substantially smooth having an Ra less than about 75 micrometers, falling in Applicant's range of greater than 1.4 and less than 0.4 micrometers per claims 14 and 16-17, making it obvious to one having ordinary skill in the art to have modified the foam of Reeves to use the foam of Gehlsen having the required Ra because Gehlsen teaches the surface of the foam is substantially smooth having an Ra less than about 75 micrometers for having a surface smooth enough to adhere to an article of interest.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a

first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Gehlsen discloses polymer foam articles having a substantially smooth surface prepared by melt-mixing a polymer composition and a plurality of microspheres, at least one of which is an expandable polymeric microsphere, under process conditions, including temperature and shear rate, selected to form an expandable extrudable composition; and extruding the composition through a die.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

Applicants also believe that Gehlsen is non-analogous art. MPEP 2141.01 indicates "*In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.*" In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Here, Gehlsen is not in Applicant's field of endeavor, that is, an article comprising a base having at least one imaging layer

applied thereto. Neither is the reference reasonably pertinent to the needs of supports for imaging layers. Such supports must be thin, smooth and somewhat flexible. (See, for example, pg. 16, line 8 – pg. 17, line 8, pg. 19, lines 22-28).

Patent and Trademark Office Classification is some evidence of analogy, but similarities and differences in structure and function carry more weight. MPEP 2141.01(a). The reference to Gehlsen cited by the Examiner is contained in a different classification. Gehlsen is contained in US Class 264/45.4 (Plastic and nonmetallic article shaping or treating: processes / Forming one layer by uniting and expanding expandable thermoplastic beads or particles), while the present invention is contained in US Class 428/304.4 (Stock material or miscellaneous articles / Composite having voids in a component (e.g., porous, cellular, etc.)). Critical differences exist in function between Applicant's invention and the cited references. The invention of Gehlsen functions to provide a smooth surfaced foam or a "foam in place" material. See col. 5, lines 2-3 and 16. Unlike the reference, the present invention functions to provide a print imaging support that is widely accepted by the consumer for imaging applications, and has the caliper, stiffness, smoothness, gloss, whiteness, and opacity expected by consumers of imaging media. Further there are important structural differences between the present invention and the prior art which are evidence of non-analogousness. The reference to Gehlsen contains no mention of imaging layers. The present invention teaches an imaging layer on a base appropriate for imaging applications. Since the cited reference is contained in a different classification, serves a different purpose and function and contains distinct structural differences, the Applicants respectfully suggest that the cited reference is non-analogous art, and does not support a rejection based on obviousness.

Assuming for argument, that the cited references are analogous art, to establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed

cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines 20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Gehlsen is silent with respect to foams having density gradients. The references to Reeves and Gehlsen, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Gehlsen, while disclosing foam, fails to mention gradient density in the foam layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers

together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claims 1-11, 19-20, 22-25, 28-39, and 41-48 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-11, 19-20, 22-25, 28-39, and 41-48 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,447,976 to Dontula et al, as Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient, teaches the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness (col. 6, lines 14-50), and, although Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1, nor using the polymers of claims 3-6 or "a gaseous phase", Dontula teaches an article having a foamed polymer core comprising a polymer foam core,

blowing agent, solid polymer matrix, and a gaseous phase as processing enhancements for the foam, making it obvious to one having ordinary skill in the art to have modified the foam of Reeves to use the ingredients as claimed because Dontula teaches a foamed polymer core comprising a polymer foam core, blowing agent, solid polymer matrix, and a gaseous phase as processing enhancements for the foam. The Examiner continues that, although Reeves does not teach further comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core (instant claims 21-25) and a flange coating layer on the foam of polymer per instant claims 32-36, 41, and 49 or paper of instant claim 39, Dontula teaches an article having a foamed polymer core comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core to form a superior imaging support and image receiving layers for printability, improve adhesion, high opacity and whiteness and a flange and coating layer on the foam of polymers per instant claims 32-38, 41 and 49 for support, flexural modulus, surface roughness or smoothness, and optical opacity and paper to provide brightness and a good starting surface and good formation, making it obvious to one having ordinary skill in the art to have modified the foam of Reeves to include an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core as per instant claims 21-25, a flange layer on the foam of polymer per instant claims 32-38 and 41, and of paper as per instant claim 39 because Dontula teaches an article having a foamed polymer core comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core to form a superior imaging support and image receiving layers for printability, improve adhesion, high opacity and whiteness, and a flange and coating layer of polyethylene on the foam of polymers per instant claims 32-38, 41 and 49 for support, flexural modulus, surface roughness or smoothness, and optical opacity and paper to provide brightness and a good starting surface and good formation strength. With respect to claims 19-20 and 29, the Examiner indicates that Reeves does not teach the thickness, however it is an optimizable feature, making it obvious to one of ordinary skill in the art to produce a thickness as claimed, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. With respect to claim 28, 30 and 31, the Examiner indicates that Reeves does not teach the flange and core base having inorganic, brighteners, tenting and whitening agents or opacity recitation

as per claims 28 and 42-48 having a b* UVO or L* value as recited per claims 30-3 1, but Dontula teaches flange and core base having inorganic, brighteners, tenting and whitening agents as per claims 28 and 42-48 having b* UVO or L* value within Applicant's ranges as recited per instant claims 30-31 for enhancing optical properties, making it obvious to have modified the foam article of Reeves to include the ingredients having the values as per claims 28, 30-31 and 42-48 because Dontula teaches including inorganic, brighteners, tenting and whitening agents as per claims 42-48 having b* UVO or L* value within Applicant's ranges as recited per instant claims 30-31 for enhancing optical properties and opacity.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Dontula '976 discloses imaging media. In a preferred form, it relates to supports for photographic, ink jet, thermal, and electrophotographic media on a base of a closed cell foam core sheet and adhered thereto an upper and lower flange sheet. The imaging member has a stiffness of between 50 and 250 millinewtons and at least one layer of the base comprises whitening agent and the element has L* of greater than 90.4.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Dontula is silent with respect to foams having density gradients. The references to Reeves and Dontula, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

The Examiner asserts that, while Reeves doesn't state the density gradient decreasing from center to surface or the use of three foam layers, it would have been obvious to one having ordinary skill to modify the invention based on the teachings of Reeves above, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Applicants are unable to find any variable in claim 1. If there is no variable, the Applicants fail to see how there can be a results effective variable. MPEP

2144.05 Variableness of Ranges states "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result- effective variable.). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy)." Claim 1 fails to contain verbiage that relates to a parameter, range or variable. The density gradient of the foam is a physical property of the layer, not a variable.

Neither do the references provide any likelihood of success. Dontula, while disclosing foam for use in the support of an imaging element, fails to mention gradient density in the foam layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to

produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Claims 2-11, 19-20, 22-25, 28-39, and 41-48 benefit from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above.

Rejection Of Claim 26 Under 35 U.S.C. §103(a):

The Examiner has rejected Claim 26 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,447,976 to Dontula et al. and further in view of USPN 6,876,467 to Yamaguchi, indicating that Reeves and Dontula are relied upon above, and, although Reeves does not explicitly teach the image comprising an autochrome imaging layer, Yamaguchi teaches a printer that prints an image shot by a digital still camera or the like on photographic paper and operates on the thermo-autochrome (TA) method is on the market. In TA method, color photographic paper (TA paper) that has C, M and Y layers itself produces the colors when it is heated and the produced colors are fixed when a light of a predetermined wavelength is thrown onto the TA paper. TA method does not require ink or toner, making it obvious to one having ordinary skill in the art to have modified the combination to include an autochrome image because Yamaguchi teaches a printer that prints an image shot

by a digital still camera or the like on photographic paper and operates on the thermoautochrome (TA) method is on the market, and, in TA method, color photographic paper (TA paper) that has C, M and Y layers itself produces the colors when it is heated and the produced colors are fixed when a light of a predetermined wavelength is thrown onto the TA paper.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Dontula '976 discloses imaging media. In a preferred form, it relates to supports for photographic, ink jet, thermal, and electrophotographic media. The invention relates to an imaging member comprising an imaging layer and a base wherein said base comprises a closed cell foam core sheet and adhered thereto an upper and lower flange sheet, and wherein said imaging member has a stiffness of between 50 and 250 millinewtons and at least one layer of said base comprises whitening agent and said element has L* of greater than 90.4.

Yamaguchi discloses a printer with an automatic density adjusting function and a density adjusting method of the printer. More particularly, this invention relates to a printer with an automatic density adjusting function that prints a color image on a color photographic paper that has a cyan (C) layer, a

magenta (M) layer and an yellow (Y) layer by producing a color of each layer and a density adjusting method of the printer. When densities of C, M and Y colors for automatic density adjustment are measured, test patterns of R, G and B colors are printed on TA paper, and a fixing lamp throws lights that have bright line spectrums of R, G and B colors onto the test patterns and amounts of reflected lights of the test patterns of R, G and B colors are measured with a light-receiving sensor that is an HP sensor for determining a reference position of the TA paper. Then, the densities of C, M and Y colors are calculated according to the amounts of the reflected lights. The color production of the C, M and Y layers of the TA paper is adjusted so that the calculated densities of C, M and Y colors are target densities.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

Claim 26 benefits from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above. Since the Examiner indicates that Yamaguchi is used only to teach the autochrome material, the reference does not overcome the shortcomings of Reeves and Dontula with respect to obviousness. In addition, Yamaguchi fails to disclose the use of foam as a support useable with an imaging layer. Also, review of Attachment B-1 illustrates the composition of Fuji's Thermo-autochrome® paper, as a base with autochrome thermal imaging layers thereon.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a

single closed cell foam layer that has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claim 27 Under 35 U.S.C. §103(a):

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,447,976 to Dontula et al. and further in view of USPN 6,342,329 to Tsuda et al, indicating that Reeves and Dontula are relied upon above, and, although Reeves does not explicitly teach a crushable dye encapsulated imaging layer, Tsuda teaches photocuring compositions including a dye are supported on a substrate in a microcapsule-encapsulated state, so that it is possible to provide an inexpensive image-forming medium with which full-color printing is possible and a reduction in density of the 3 primary colors, etc., can be prevented using microcapsules that can be easily produced by conventional methods, teaches a crushing roller employed when the rupturing doesn't take place on its own, and the dye flows out and reacts with the developer and coloration takes place to form an image and the image density is improved, making it obvious to one having ordinary skill in the art to have modified the combination to further include a crushable dye encapsulated imaging layer according to Tsuda.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the

skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Dontula '976 discloses imaging media. In a preferred form, it relates to supports for photographic, ink jet, thermal, and electrophotographic media. The invention relates to an imaging member comprising an imaging layer and a base wherein said base comprises a closed cell foam core sheet and adhered thereto an upper and lower flange sheet, and wherein said imaging member has a stiffness of between 50 and 250 millinewtons and at least one layer of said base comprises whitening agent and said element has L* of greater than 90.4.

Tsuda discloses an image-forming medium used in image-forming apparatuses such as printers, in which an image-forming medium comprises a substrate and several types of photo-curing compositions with sensitivity peaks in different wavelength regions supported thereon. Each of the several types of photocuring compositions contains a spectral sensitizer which is designed so that there is apparently no crosstalk in an image which is formed using the image-forming medium.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

Claim 27 benefits from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above. Further, the present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the

closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Dontula is silent with respect to foams having density gradients. In addition, Tsuda fails to disclose the use of foam as a support useable with an imaging layer. The references to Reeves, Tsuda and Dontula, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Dontula, while disclosing foam for use in the support of an imaging element, fails to mention gradient density in the foam layer. Tsuda fails to disclose the use of foam as a support useable with an imaging layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material

useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claim 40 Under 35 U.S.C. §103(a):

The Examiner has rejected Claim 40 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,447,976 to Dontula et al. and further in view of USPN 6,627,018 to O'Neill et al., as Reeves and Dontula are relied upon above, and, although Reeves does not explicitly teach the flange comprising fabrics, Dontula teaches the flange comprises polyester and glass fibers, and O'Neill teaches a polymer foam core surrounded by polymeric sheets and includes fibers to make a fibrous layer to impart to the composite modulus stiffness and compressive strength, making it obvious to one having ordinary skill in the art to have modified the combination to include a flange of fabric because Dontula teaches the flange comprises polyester and glass fibers and O'Neill teaches a polymer foam core surrounded by

polymeric sheets and includes fibers to make a fibrous layer to impart to the composite modulus stiffness and compressive strength.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Dontula '976 discloses imaging media. In a preferred form, it relates to supports for photographic, ink jet, thermal, and electrophotographic media. The invention relates to an imaging member comprising an imaging layer and a base wherein said base comprises a closed cell foam core sheet and adhered thereto an upper and lower flange sheet, and wherein said imaging member has a stiffness of between 50 and 250 millinewtons and at least one layer of said base comprises whitening agent and said element has L* of greater than 90.4.

O'Neill discloses a system and method for forming a composite structure that involves providing at least two polymeric sheets as outer layers such that a cavity is formed therebetween, adhesively bonding fibrous layers to the polymeric layers to hold the fibrous layers in place during processing, and processing to produce fibrous layers with a dense, resinous layer between each fibrous layer and adjacent polymeric layer.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

The Applicants believe that O'Neill is non-analogous art. MPEP 2141.01 indicates "*In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned.*" In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). Here, O'Neill is not in Applicant's field of endeavor, that is, an article comprising a base having at least one imaging layer applied thereto. Neither is the reference reasonably pertinent to the needs of supports for imaging layers. Such supports must be thin, smooth and somewhat flexible. (See, for example, pg. 16, line 8 – pg. 17, line 8, pg. 19, lines 22-28).

Patent and Trademark Office Classification is some evidence of analogy, but similarities and differences in structure and function carry more weight. MPEP 2141.01(a). The reference to O'Neill cited by the Examiner is contained in a different classification. O'Neill is contained in US Class 156/78 (Adhesive bonding and miscellaneous chemical manufacture / Foaming, while the present invention is contained in US Class 428/304.4 (Stock material or miscellaneous articles / Composite having voids in a component (e.g., porous, cellular, etc.)). Critical differences exist in function between Applicant's invention and the cited references. The invention of O'Neill functions to provide large structural composite in relatively high volumes with high strength for use in automobiles, trucks, recreational vehicles, and boats. See col. 3, lines 8-9 and col.1, lines 23-25. Unlike the reference, the present invention functions to provide a print imaging support that is widely accepted by the consumer for imaging applications, and has the caliper, stiffness, smoothness, gloss, whiteness, and opacity expected by consumers of imaging media. Further there are important structural differences between the present invention and the prior art which are evidence of non-analogousness. The composites of O'Neill contain no imaging layers. The present invention teaches an imaging layer on a base appropriate for imaging applications. Imagine for a moment using a sheet of photographic

material, typically .004 – .016 inches in thickness, as a hard top for an SUV. (Col. 4, lines 25-32). Now imagine using the material used to boat hulls or vehicle hard tops to preserve consumer photographic images. Since the cited reference is contained in a different classification, serves a different purpose and function and contains distinct structural differences, the Applicants respectfully suggest that the cited reference is non-analogous art, and does not support a rejection based on obviousness.

Assuming for argument, that the cited references are analogous art, to establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

Claim 40 benefits from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above. Further, the present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. O'Neill and Dontula are silent with respect to foams having density gradients. The only density mentioned in O'Neill is that of the fibrous material. See col. 16, lines 38 and 60. The references to Reeves and Dontula, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Dontula, while disclosing foam for use in the support of an imaging element, fails

to mention gradient density in the foam layer. O'Neill fails to mention foam density, a density gradient or use of a foam as a support for an imaging layer, disclosing instead a composite fiber-reinforced polymeric structure particularly advantageous for forming relatively large composite structures, such as structural components for automobiles, trucks, recreational vehicles, and boats. (Field of the Invention; see also col. 4, lines 20-32) Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally, Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a

closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Rejection Of Claims 1-11, 19-20, 22-25, 28-39, and 41-49 Under 35 U.S.C. §103(a):

The Examiner has rejected Claims 1-11, 19-20, 22-25, 28-39, and 41-49 under 35 U.S.C. 103(a) as being unpatentable over USPN 5,916,672 to Reeves et al. in view of USPN 6,537,656 to Dontula et al, as Reeves teaches an article per instant claim 1 comprising a base wherein said base comprises a closed cell polypropylene or polyurethane expanded foam core sheet, wherein said closed cell foam core sheet comprises two closed cell foam layers, wherein said at least one closed cell foam layer, and wherein said closed cell foam core sheet has a density wherein said density comprises a gradient and teaches the density gradient in the polymer core is effected by the expansion of cells and amount of air entrapped and may be contained in a numerous amounts of layers to reach the chosen thickness, and, while Reeves doesn't state the density gradient decreasing from center to surface or the use of three foam layers, it would have been obvious to one having ordinary skill to modify the invention based on the teachings of Reeves above, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. The Examiner continues that, while Reeves does not teach the polypropylene or polyurethane closed cell expanded foam layer comprises a polymer that has been expanded through the use of a blowing agent per instant claim 1, nor using the polymers of claims 3-6 or "a gaseous phase", Dontula teaches an article having a foamed polymer core comprising a polymer foam core, blowing agent, solid polymer matrix, and a gaseous phase as processing enhancements for the foam, making it obvious to one having ordinary skill in the art to have modified the foam of Reeves to use the ingredients as claimed because Dontula teaches a foamed polymer core comprising a polymer foam core, blowing agent, solid polymer matrix, and a gaseous phase as processing enhancements for the foam, and, while Reeves does

not teach further comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core, Dontula teaches an article having a foamed polymer core comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core to form a superior imaging support and image receiving layers for printability, improve adhesion, high opacity and whiteness, making it obvious to one having ordinary skill in the art to have modified the foam of Reeves to include an imaging layer such as ink jet,, thermal dye, electrophotographic applied to the core as per instant claims 1, 22-25, a flange layer on the foam of polymer per instant claims 32-38 and 41, and of paper as per instant claim 39 because Dontula teaches an article having a foamed polymer core comprising an imaging layer such as ink jet, thermal dye, electrophotographic applied to the core to form a superior imaging support and image receiving layers for printability, improve adhesion, high opacity and whiteness and a flange and coating layer on the foam of polymers per instant claims 32-38, 41 and 49 for support, flexural modulus, surface roughness or smoothness, and optical opacity and paper to provide brightness and a good starting surface and good formation strength. The Examiner indicates that, with respect to claims 19-20 and 29, Reeves does not teach the thickness, however it is an optimizable feature, making it obvious to one of ordinary skill in the art to produce a thickness as claimed, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art, and, although Reeves does not teach the flange and core base having inorganic, brighteners, tenting and whitening agents or opacity recitation as per claims 28 and 42-48 having a b* UVO or L* value as recited per claims 30-31, Dontula teaches flange and core base having inorganic, brighteners, tenting and whitening agents as per claims 28 and 42-48 having b* UVO or L* value within Applicant's ranges as recited per instant claims 30-31 for enhancing optical, making it obvious to have modified the foam article of Reeves to include the ingredients having the values as per claims 28, 30-31 and 42-48 because Dontula teaches including inorganic, brighteners, tenting and whitening agents as per claims 42-48 having b* UVO or L* value within Applicant's ranges as recited per instant claims 30-31 for enhancing optical properties and opacity.

Reeves discloses thermoplastic composite materials and, more particularly, thermoplastic multi-layer composite structure, which consists in a

first embodiment of a co-extruded acrylic polypropylene outer skin and high melt strength polypropylene substrate which is attached to a first surface of a polypropylene foam core. An inner polypropylene skin can be provided and is attached to a second surface of the foam core. The foam core can either be constructed from an expanded polypropylene or an extruded polypropylene. Where an expanded polypropylene foam core is provided, the foam core is attached to the outer and inner skin through the use of a polypropylene adhesive. Where the extruded polypropylene foam core is provided, the skins can be attached to the foam core through a welding or bonding process in lieu of adhesives. The polypropylene adhesives can also be utilized for attaching the skins to the extruded foam core. Additionally, the extruded foam core can vary in density to provide a composite foam core. Preferably, the various densities of the composite foam core are arranged such that the lowest density foam is provided at the center of the core and the varying densities of the foam core extend outward from the center in numerical order. As discussed above, the Applicants believe that Reeves is non-analogous art.

Dontula '656 discloses imaging media, which, in a preferred form, serve as supports for photographic, ink jet, thermal, and electrophotographic media. The imaging member comprises an imaging layer and a base wherein said base comprises a closed cell foam core sheet and adhered thereto an upper and lower flange sheet, and wherein said imaging member has a stiffness of between 50 and 250 millinewtons.

The present invention relates to an article comprising a base and at least one imaging layer. The base comprises a closed cell foam core sheet with at least one closed cell foam layer made of a polymer that has been expanded through the use of a blowing agent to form a single closed cell foam layer that has a density gradient.

To establish a prima facia case of obviousness, there must be some suggestion or motivation in the reference or in the general knowledge available to one skilled in the art to modify the reference, there must be a reasonable expectation of success, and the prior art reference must teach or suggest all the claim limitations.

The present claims are directed to a closed cell foam core sheet having at least one layer of foam that has a density gradient. As written, the claim

indicates that the closed cell foam layer has the density gradient, not the closed cell foam core sheet. As worded, any gradient in the core sheet is found in the closed cell foam layer. If there is more than at least one layer, there is more than at least one density gradient. The reference to Reeves teaches foam layers with the same gradient throughout the foam layer. To form a core of varying density, multiple layers of foam, layers with uniform but differing individual densities are adhered together to form a gradient in the multilayer core. One overall gradient produced by three layers. See Fig. 3-5, 7-10, as well as col. 3, lines 49-55, and col. 6, lines20-24 of Reeves. According to the present claims, if there are three closed cell foam core layers, there would be three density gradients, one internal to each foam layer, in the core sheet as a whole. Dontula is silent with respect to foams having density gradients. The references to Reeves and Dontula, whether alone or in combination, fail to teach or suggest the presently claimed foam core sheet for an imaging element, containing at least one closed cell foam layer, each layer of foam with an individual density gradient.

Neither do the references provide any likelihood of success. Dontula, while disclosing foam for use in the support of an imaging element, fails to mention gradient density in the foam layer. Reeves discloses the use of multiple layers of foam, fused together, to produce a composite material which can be utilized to replace fiberglass or other materials such as polyurethanes during the manufacture of products normally containing fiberglass or the other materials as a primary component. Reeves does not provide any likelihood of success for the use of a foam core sheet as a support for use with imaging layers. Neither would one of ordinary skill in the art look to the teachings of Reeves for information relating to the support for an imaging layer, as the structure of Reeves provides properties, such as a relatively hard and stiff surface, superior impact strength as compared to fiberglass, and will absorb a relatively higher amount energy as compared to fiberglass, wood, composite structures containing polyurethane or similar structures. See col. 3, line 63 – col. 4, line 26, as compared to the present specification, at pg. 1, lines 8-12, pg. 16, line 6 – pg. 17, line 5, and pg. 19, line 13 – 24. As indicated, materials that are too stiff are not manufacturable. One of ordinary skill in the art would not look to a stiff material useful, for example, as a boat hull, to duplicate the stiffness requirements of a support bearing an imaging layer, for example, photographic paper. Finally,

Reeves requires multiple layers to produce a gradient core, that is, production of individual foam layers of differing densities and fusing the layers together, to produce a gradient density core. The present invention provides a foam core sheet containing as few as one foam layer with a density gradient.

Neither reference teaches or suggests, "*at least one closed cell foam layer comprises a polymer that has been expanded through the use of a blowing agent, and wherein said closed cell foam layer has a density wherein said density comprises a gradient*". Therefore, the references fail to disclose all of the limitations of the present claims.

Therefore, since the references, alone and in combination, fail to provide any suggestion to combine the references or modify the references to produce an article comprising an imaging layer and a base, wherein the base is a closed cell foam core sheet with at least one closed cell foam layer, in which the closed cell foam layer has a density gradient, fail to include any likelihood of success in providing such an article and fail to include all of the limitations of the present claims, specifically with respect to a core sheet made of at least one closed cell foam layer that has a density gradient, the Applicants request that the Examiner reconsider and withdraw the rejection.

Claims 2-1-11, 19-20, 22-25, 28-39, and 41-49 benefit from dependence on claim 1 which Applicants believe is patentable over Reeves and Dontula as discussed above.

It is believed that the foregoing is a complete response to the Office Action and that the claims are in condition for allowance.

Applicants respectfully request early allowance to obviate the appeal.

Respectfully submitted,

Lynne M. Blank

Attorney for Applicant(s)
Registration No. 42,334

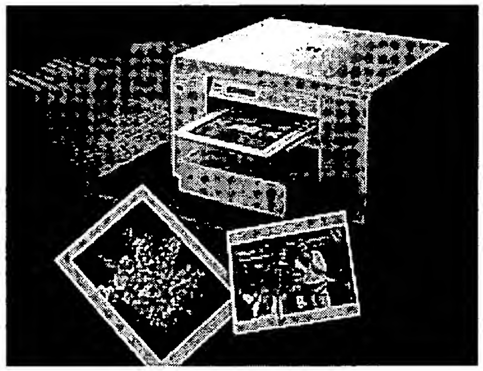
Lynne M. Blank/ct
Rochester, NY 14650
Telephone: 585-477-7418
Facsimile: 585-477-1148

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.

FUJIX THERMO AUTOCHROME PRINTERS

Printers which do not use ribbon, ink, dye, toner, or chemicals - and do not produce any waste.

by John Henshall



Attachment B-1
SN 10/780263

The Fujix NC-500 Thermo-Autochrome printer.

Production of photographic quality prints from digital image files has now been possible for some years. The Kodak XL7700 dye sublimation printer set the benchmark by which all other dye sub printers are judged before it was replaced by the equally magnificent XLT7720. Intended for military use, mounted in nineteen inch equipment racks, these printers are built like battleships yet produce the most beautiful prints - up to eleven inches square - on the highest quality media of any digital printer. The paper is an elegant semi-matte, reminiscent of fine double-weight photographic paper. Metameric properties - how the prints look in different ambient illuminants, such as daylight, tungsten and fluorescent - beat most later dye-sub printers.

After the £18,000 XLT7720 came the Kodak XLS8300, followed by the XLS8600. The media is thinner, high gloss and has a not so attractive metallic look, but these reliable, high quality machines are very fast, one third the price and have become the standard.

The main problem is that dye sublimation printers generally only go up to A4, occasionally A3. No good for large prints.

Up to A0 - 841x1188mm (33x46.75 inches) - the high quality field has been left almost entirely to the Iris ink-jet printers, distributed in the UK by Ilford. Capable of printing on a variety of media, including hand-made watercolour paper, these printers are in a class of their own. With new dyes, resistant to water and fading, they become archival quality. But even the newer higher speed machines are not capable of volume throughput.

We are undoubtedly moving towards plain paper printers, though this is not going to be popular with the suppliers of consumables, other than paper. Before too long we will have multi-function A3 or larger machines which will be flatbed scanner, colour photocopier, colour fax and photographic quality colour laser printer all rolled into one. The indications are with us already. A4 bubble jet colour printers of surprisingly good quality now cost under £300. That same sum would buy a good dye-sub printer, the Fargo FotoFUN - though it is restricted to a maximum print size of 6x4 inches. Colour laser printers such as the £4,500 A4 Apple Colour LaserWriter 12/600PS with Colour Photograde are dramatically narrowing the gap between photographic quality and simply being 'coloured'.

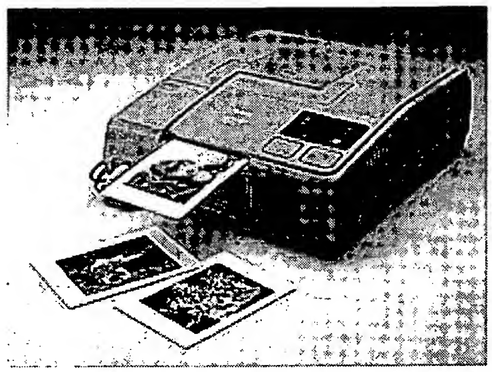
Other printers abound. Huge poster-sized machines can make giant 'joiners' with much greater precision than photographic enlargements and chemical processing. Hybrid systems such as the Metrum FotoPrint and Ilford Ilfochrome Digital Imager (IDI) combine digital exposure with conventional chemical processing to produce richly toned photographic prints without negative or transparency. Fuji prefer to innovate, rather than take on the competition with alternative versions of the same technology. Still something of an unintentional Fuji 'secret', the Pictrography 3000 is probably the best A4 digital printer made to date. Its prints have the most wonderful tonal gradation with 400dpi

sharpness. The price has recently been reduced from £18,000 to around £12,000, which should help the Pictrography build the larger user base it deserves.

Dye-sublimation printers have a donor ribbon which has to be thrown away after use, along with its plastic carrier. The ribbon holds sufficient dye to print the densest of images, so it is only partly exhausted when discarded. Although less harmful to the environment than processing chemicals, this is expensive and wasteful. Ink jet and laser printers also need consumables and disposable carriers in addition to paper.

A printer which does not use any ribbon, ink, dye, toner, or chemicals, does not produce any waste and only uses paper and a little electricity seems an impossibility. But no, it's already a reality: Fuji's Thermo-Autochrome system.

The first printer to use this new technology is the Fujix Fotojoy NC-1, seen at Photokina in September 1994.



Attachment D-1
SN 10/780263

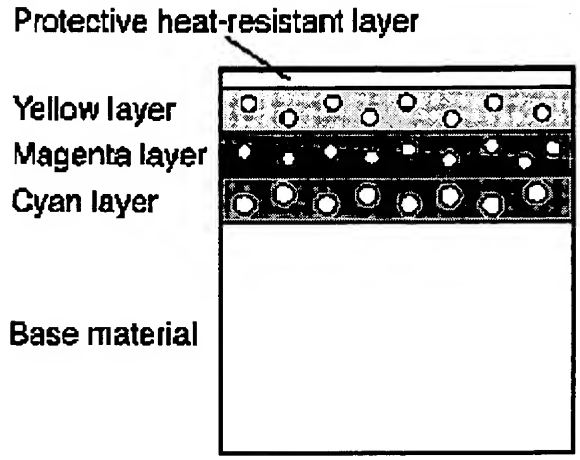
Fujix Fotojoy NC-1 Thermo-Autochrome printer.

This small printer, 300mm wide x 110mm high x 310mm deep (12x4.25x12.25 inches), produces 78x100mm (3x4 inches) images on 100x140mm (4x5.5 inches) paper at a resolution of about 150dpi from video (analogue) input, composite or S-video, and will reproduce 128 levels of each of red, green and blue.

By the PMA show in London, late in 1995, there was a second generation printer: the Fujix NC-500. This is a 300dpi device with SCSI digital input which produces 24 bit images (256 levels of each of R, G and B) up to 200x277mm (8x11 inches) on paper up to long A4, 210x325mm (8.3x12.8 inches). The printer also produces images 200x249mm (8x10 inches) on true A4 size paper, and 'half size' images 200x132mm (8x5 inches) on 210x180mm (8.25x7.1 inches) paper. Print time is just over two minutes.

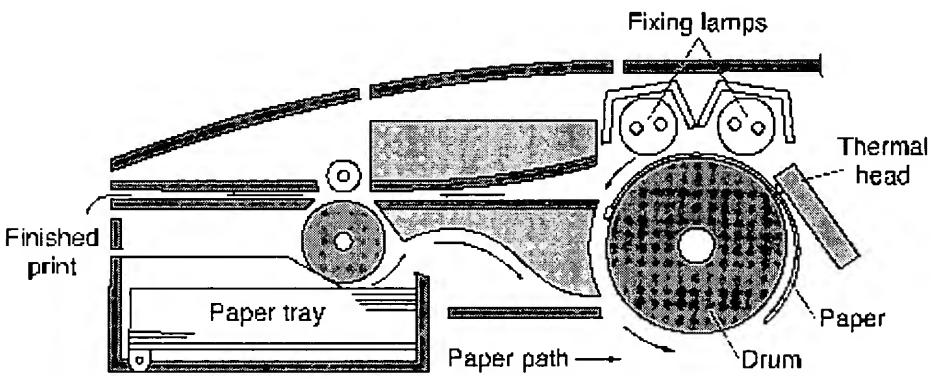
At Photokina 1994, Fuji stated that 150 patents had been filed during the development of their Thermo-Autochrome system. By PMA London, that number had grown to 400. The quality of prints from the NC-500 was noticeably better than from the NC-1 a year earlier, reflecting the additional work and patent applications which had been necessary to refine the system.

The major advances are in the special paper, which uses an exclusive heat-sensitive microcapsule system with a new diazo compound and coupler technology, held in the three colour layers.



Cross section through Thermo-Autochrome paper.

The image is formed by heating a thermal head - the 'Thermo' part - in proportion to the amount of colour required to be synthesised by the thermo-sensitive paper - the 'Autochrome' part. Prints have a rich tonal range, said to be close to silver halide in quality. They are crisp and vivid.

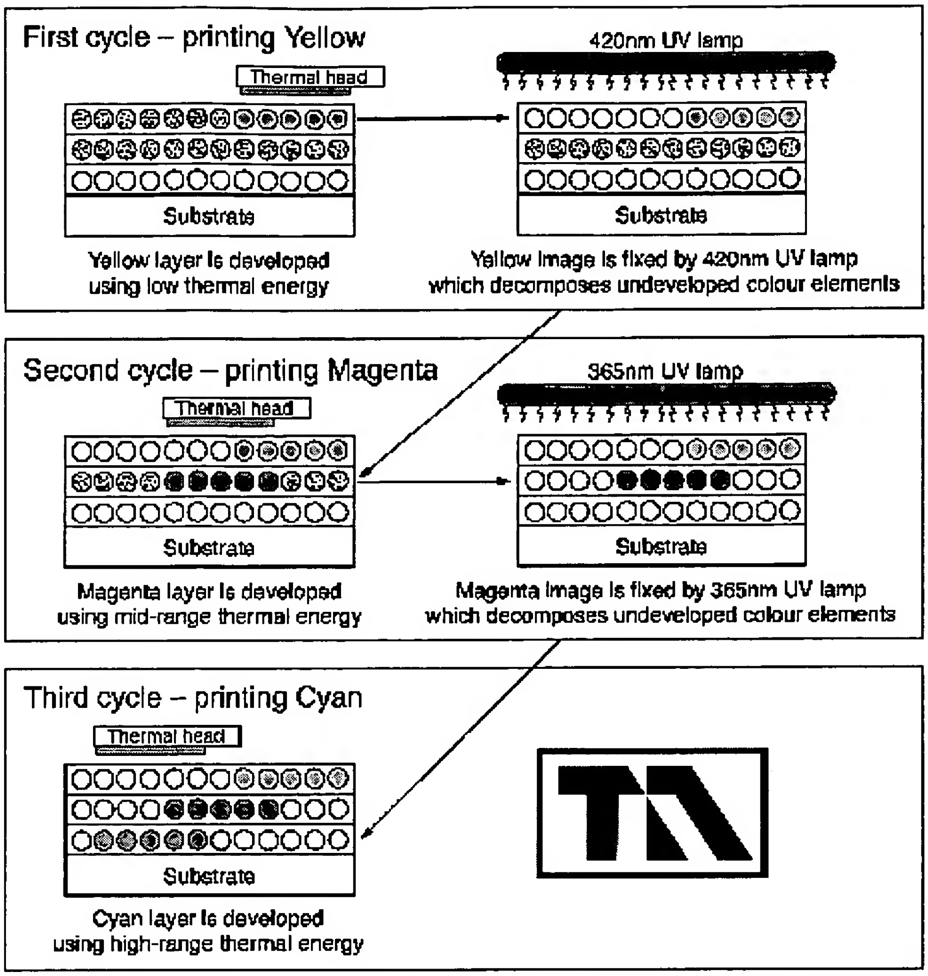


Attachment B-1
SN 10/780263

Thermo-Autochrome printer mechanism.

Because the printer mechanism is more simple than that in a dye sublimation printer, Thermo-Autochrome printers should be very reliable, consistent, maintenance free - and hopefully cheaper too. The absence of disposable ribbons, inks, dyes, toners and chemicals should also keep the cost of consumables down. Printers up to A0 and roll prints are said to be feasible and Fuji are actively seeking new commercial alliances for their TA technology.

The print goes through three cycles as it is created. The paper is firmly clamped to a drum which holds it in precise register for all three cycles. The first cycle develops the yellow layer, using low thermal energy in the thermal head. Heat is applied locally and precisely, every three hundredth of an inch, in the correct proportion for the amount of colour required in each specific point on the print. The yellow image is then 'fixed' by exposing the entire print to a 420nm ultra-violet lamp, which decomposes the undeveloped yellow colour elements, destroying their colour-synthesising properties. The second cycle is the development of the magenta layer. This uses mid-range thermal energy, which penetrates into the middle colour synthesising layer of the paper. The magenta image is then 'fixed' by exposure to a 365nm UV lamp. The third and final cycle is the development of the cyan image, using high-range thermal energy to penetrate down to the lowest colour synthesising layer.



The Thermo-Autochrome printing cycles.

Thermo-Autochrome does not use any ribbon, ink, dye, toner, or chemicals. Nor does it produce any waste. It only uses paper - and a little electricity.

Thermo-Autochrome is my tip as a major innovation to watch out for in 1996 and beyond. It has the potential to make a revolutionary impact on low-cost, photographic quality digital colour printing.

Be sure to keep the price low, Fuji - and don't forget to shout it from the rooftops.

This review first appeared as "John Henshall's Chip Shop" in "The Photographer" magazine, January 1996.

EPICENTRE LIBRARY INDEX HOME

Attachment B-1
SN 10/780263